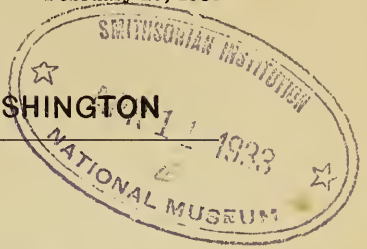


PROCEEDINGS
OF THE
BIOLOGICAL SOCIETY OF WASHINGTON



DESCRIPTIONS OF APHIIDAE FROM WESTERN
COLORADO.

BY F. C. HOTTES.

The summers of 1931 and 1932 offered exceptional opportunities to collect aphids on the Western Slope of Colorado, a section of the state not as thoroughly worked by Professors Gillette and Palmer as that more conveniently located for them near Fort Collins, on the eastern side of the mountains. As a result of the two seasons work the new species and hitherto undescribed forms of Aphidae are here described.

Most of the forms described here were collected between Skyway (a summer post-office and supply store, located on the shore of Mesa Lake), and the top of Grand Mesa (a volcanic plateau of some 10,000 feet altitude), upon the top of which four of the species described here were collected. In this region spring comes late and fall puts in its appearance unmistakably early so that the full cycle of events in the family life of an aphid species must of necessity be crowded into two short months.

I would gratefully acknowledge the opinions of Professors Gillette and Palmer and Dr. P. W. Mason to whom certain of these species were sent for study before being definitely considered as new.

In this paper I have chosen to use the generic terms *Dactynotus* and *Adactynus* proposed by Rafinesque for the generic terms *Macrosyphum* and *Myzus*, and I shall continue to do so until the Zoological Congress rules otherwise.

Cinara fornacula Hottes.

STEM MOTHER.

Size and general color.—Average length from vertex to tip of anal plate, 4.49. Entire body slightly pruinose. Head somewhat yellowish or light dusky brown with a rather conspicuous dark median line. Thorax and

abdomen light pea green. Cornicles concolorous with abdomen. Cauda slightly dusky. In mounted specimens small browned wax pore-plates may be seen on the dorsum of the abdomen and thorax. The first antennal segment is concolorous with head at the base but is lighter toward its distal end; the second and third antennal segments are light yellowish in color. The third segment may occasionally be light dusky toward its apex. Fourth, fifth, and sixth antennal segments light dusky with their apical ends darker; the sixth antennal segment is considerably darker than the other segments. Eyes dark brown. Beak with last three segments dark brown, remaining segments considerably lighter in color, apical portion of long segment more or less mottled, or entirely brown. Coxae and femora of all legs light yellowish brown (femora darker towards apex). Tibiae light yellowish-brown with apical portions brown. Tarsi dusky brown.

Head and appendages.—Average width of head across eyes, .90. Antennal segments with the following comparative lengths: III—.57 to .67, average .62; IV—.20 to .24, average .23; V—.24 to .29, average .27; VI—.16 to .20, average .18 plus .04. Secondary sensoria confined to apical half of fifth antennal segment, numbering from 0 to 2, usually 1. Primary sensorium on sixth antennal segment large and rarely with more than three widely scattered marginal sensoria. Hairs on third antennal segment brown; about one-fifth longer than width of segment, considerably longer than this on fourth and fifth antennal segments. The hair on the antennae are fairly straight and leave the segments at an angle of approximately 45°. For the genus, they are comparatively few in number. Compound eyes with ocular tubercles. Beak long, reaching beyond metathoracic coxae.

Thorax and appendages.—Lateral and dorsal portion of thorax with approximately twenty-four wax pore-plates arranged in groups of two, in four, more or less irregular rows, two more or less lateral and two dorsal. All femora with a row of sensoria on their posterior surfaces. Tibiae comparatively straight, hairs on outer surface of tibiae inclined at an angle of 45°, and approximately one-seventh shorter than width of segment. Second segment of tarsus considerably curved and approximately seven times as long as the first tarsal segment.

Abdomen.—Width of base of cornicles approximately .24. Exact width often difficult to determine because of lack of differentiation between cornicles and rest of abdomen. Hairs on base of cornicles of one kind considerably finer in quality than those on remaining portion of abdomen. Lateral and dorsal portions of abdomen with approximately thirty wax pore-plates arranged in four more or less irregular rows, rows on anterior portion of abdomen with more wax pore-plates than those on posterior portion of abdomen. Cauda broadly rounded, approximately five times as wide at the base as long. Hairs on body long and spine-like.

OVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 3.08. Color essentially similar to that of stem mother, but differing in the

following respects: Head lighter in color; antennal segments five and six alone dusky; tibiae almost uniform in color, very slightly if any darker at apex; tarsi brownish at base, dark brown toward apex; tip of abdomen more farinose than remaining portion of abdomen.

Head and appendages.—Average width of head across eyes, .71. Antennal segments with comparative lengths as follows: III—.46 to .53, average .50; IV—.16 to .20, average .185; V—.23 to .29, average .255; VI—.14 to .19, average .16 plus .04. Secondary sensoria confined to fifth antennal segment, numbering from 0 to 1, usually 1. Long segment of beak extending to base of metathoracic coxae, and last segment extending to the beginning of the femora. Head with usual transverse line.

Thorax.—Dorsal margin of thorax with approximately six very small groups of wax pore-plates. Hind tibiae with approximately fifty sensoria on apical half of segment. Abdomen as in the stem mother except for the wax pore-plates which are very small and considerably lighter in color. Abdomen with posterior portion decidedly narrowed and elongated beyond cornicles. Abdomen in mature specimens usually containing but two or three eggs which are afterward deposited on the needles of the host.

ALATE MALE.

Average length of two specimens, 2.04. Head and thorax dark brown, shading to black. Abdomen with exception of genitalia light pea green. Antennae with exception of basal portion of third antennal segment dark brown. Beak colored as in stem mother; in length extending to beginning of femora of metathoracic legs. Proportional lengths of antennal segments as follows: III—.70 to .71; IV—.24 to .27; V—.30 to .34; VI—.19, plus .07. Secondary sensoria distributed as follows: III—85 to 96; IV—32 to 24; V—10 to 19; VI—0. Secondary sensoria distributed on all surfaces and throughout length of segments except on fifth segment where sensoria are more nearly confined to one side. The wings of both specimens are partly injured and consequently not good for study of venation. The hairs on the antennae are comparatively scarce, inclined at an angle of about 45°, and about one and two-fifths as long as the width of the segment. On the outer surface of the hind tibiae, the hairs are about three times as long as the width of this segment. Toward the base of the tibiae the hairs are quite upright, but toward the apex they are inclined at an angle of about 45°. The hairs on the male are much finer in quality than those of the females.

Data associated with specimens described here: July 15, 1931, immature stem mother observed; July 31, the mature stem mothers taken; August 5, viviparous female taken; August 24, oviparous female and males taken. All specimens were taken on *Picia pugnans* Englm. growing in a comparatively small area on the top of Grand Mesa near Skyway, Colorado. The specimens were for the most part taken by vigorously beating the branches of trees, suspected of harboring this species, over a net. After their presence on a tree was detected by beating, a few specimens were obtained in the usual manner. These aphids occur singly at the base of the needles of the

present season's growth. They are not attended by ants. Their protective coloration is ideal, being nearly that of the color of the needles at their base. Once disturbed, the specimens move about very actively, somewhat suggestive of large spiders. It is surprising that no alate forms were observed during the collecting seasons of 1931 and '32.

On August 16, 1932, bright orange colored specimens, identical in all other respects to specimens herein described were collected.

Morphotype.—Apterous viviparous female (stem mother) July 21, 1931, Skyway, Colorado, on *Picea pugnans*. *Allotype*.—Alate male, August 24, 1931, remaining data same as for stem mother. *Morphotype*.—Oviparous female, same data as male. All types herein described deposited in the U. S. National Museum.

Cinara lasiocarpae [Gillette & Palmer].

OVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 4.93. Head dark brown, divided by darker median line. Thorax and abdomen brown, mottled with darker brown and powdery secretion. First antennal segment concolorous with head; remaining antennal segments yellowish with apical portions dusky. Last three segments of beak dark brown. Coxae and trochanters dark brown to black. Femora yellowish at base, shading to dark dusky brown apically. Tibiae yellowish-brown near the base, remaining portion varying from dusky brown to almost black at the apex. Tarsi dark blackish-brown. Base of cornicles dark dusky brown, considerably darker than the rest of the abdomen.

Head and appendages.—Antennal segments with the following comparative lengths: III—.93 to 1.07, average 1.02; IV—.39 to .43, average .416; V—.36 to .46, average .416; VI—.21, plus .07. Secondary sensoria distributed as follows: III—0; IV—0-1; V—2. Marginal sensoria on sixth segment, numbering about 6. Beak exceptionally long, reaching almost to base of cornicles.

Thorax.—Sensoria on hind tibiae too numerous to count, distributed throughout the length of tibiae except for the extreme basal portion.

Abdomen.—Cornicles situated on blunt basal cones which average .64 across base. Hair on antennae coarse, about twice as long as width of segment on the third antennal segment and about three times as long as width of segment on the fourth and fifth antennal segments, set at an angle of about 50°. Hairs on base of cornicles of one type similar to hair on rest of body. Hairs on outer margins of tibiae coarse and a little more than one-half width of segment.

Collection data for morphotypic female.—Collected on mature branches or trunks of young trees of *Abies lasiocarpi* Nutt., August 24, 1931, at Skyway, Colorado. Stem mothers and apterous viviparous females of this species were very abundant on the branches and trunks of young trees July 5, 1931. Two weeks later not an aphid of this species was to be found. Apterous viviparous females of this species were collected in the season of 1932 on the same trees infested during 1931. Alate viviparous

females of this species are yet to be taken. Morphotypic slide deposited in the U. S. National Museum.

Cinara wanepae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.43. Width of head across eyes, .64. Entire body shiny black. Third antennal segment somewhat lighter at the base than the remaining portion of the segment. Antennae otherwise dark brown. Femora yellowish-brown at the base, remaining portion brownish-black. Tibiae brownish-black. Prothoracic and mesothoracic tibiae somewhat lighter near the middle. Stigma dark brown, accessory radial thickening present. Beak brown, mottled with yellowish-brown.

Head and appendages.—Antennal segments with the following proportional lengths: III—.49; IV—.19; V—.26; VI—.14 plus .04. Secondary sensoria distributed as follows: III—six large circular sensoria arranged in a straight row; IV—1; V—2. Hairs on third antennal segment comparatively few for genus, forming an angle of more than 75° with the segment. Hairs on outer face of segment more upright than those on posterior face. Ocular tubercles poorly developed. Beak exceptionally long, reaching almost to the tip of the abdomen.

Thorax.—Veination very abnormal. Media apparently only once branched (exact condition impossible to determine due to faulty technique of mounting single specimen). Hind tibiae 2. long. Hairs on hind tibiae very upright and about one and one-half times as long as width of segment. Somewhat longer than this towards the apex and decidedly less upright.

Abdomen.—Base of cornicles .49 wide. Cauda much wider than long, differing very little from the anal plate.

APTEROUS OVIPAROUS FEMALE.

Size and general color.—Average length of body from vertex to tip of anal plate, 2.02. Average width of head through the eyes, .67. Entire body except appendages and portion of abdomen posterior to the cornicles shiny black. Portion of abdomen posterior to the cornicles white. The pulberulent matter appearing caked and shiny, decidedly different in appearance from the usual condition. First and second antennal segments concolorous with the head. Third antennal segment with basal two-thirds yellowish-brown, remaining portion brown; remaining antennal segments brown. Beak brown. Femora blackish-brown except at base where they are a yellowish-brown. Tibiae dusky brown but blackish at the knees, blackish-brown apically. Tarsi brownish-black.

Head and appendages.—Antennae with the following proportional lengths: III—.40 to .47, average .43; IV—.13 to .20, average .17; V—.20 to .23, average .22; VI—.10 to .14, average .12 plus .03 to .04, average .04. Secondary sensoria usually present on the third, fourth, and fifth antennal segments. On the third segment they vary from 0 to 2, on the fourth from 0 to 1, and on the fifth from 0 to 1. The beak is very long, reaching

at least to the base of the cornicles and usually almost to the tip of the abdomen.

Thorax.—Hind tibiae long (1.44), extremely free from sensoria. Hair on outer margins of tibiae about equal to width of segment or but very little shorter. Very upright except on curved portion of tibiae where they are somewhat more inclined.

Abdomen.—With the base of the cornicle about .45 wide. Cauda and anal plate as in the alate viviparous female.

If one be allowed to substitute oviparous females for apterous viviparous females where Gillette and Palmer's key in the Aphidae of Colorado, Part I calls for the latter, this species may be keyed to *Cinara vandykei*, from which it differs in the entire absence of pulverulent material in the alate viviparous female; in the size and length of the hind tibiae of the alate viviparous female; the broader and shallower cauda in the alate viviparous female; and the fewer sensoria on the hind tibiae of the oviparous female.

Holotype.—Alate viviparous female. *Morphotype.*—Apterous oviparous female collected on the stems and branches of *Picea pungens*, Skyway, Colorado, August 4, and August 23, 1932.

***Aphis chipetae*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.07. Width of head across eyes, .41. Head and thorax dark blackish-brown, darkest on the dorsum. Abdomen light green with brownish markings as follows: five lateral brownish spots anterior to the cornicles, each spot with a large green glandular area near the ventral surface; posterior to the cornicles there are three brownish bands extending from the lateral margins of the abdomen across the dorsum. The cornicles are not surrounded at their base by these brownish bands, they being concolorous at the base with the rest of the abdomen. Dorsum of abdomen with very faint, narrow, irregular rows of brownish specks which appear to originate in the brownish lateral spots. Cornicles very dark brown, almost black. Cauda with a V-shaped yellowish area extending almost its entire length on the dorsum, the remaining portion brown. Anal plate brown. Antennae uniform dark brown. Beak greenish-yellow basely, remaining portion brown. Femora with basal portion yellowish, remaining portion brown. Tibiae brown with apical portions usually somewhat darker. Tarsi brown. Veins of forewings very dark brown bordered with fuscous; edge of wings also bordered with fuscous.

Head and appendages.—Antennal segments with the following proportional lengths: III—.31 to .43, average .37; IV—.26 to .31, average .29; V—.24 to .29, average .25; VI—.09 to .11, average .10 plus .43 to .50, average .50. Secondary sensoria varying tremendously in size, situated on the third, fourth, and fifth antennal segments. All sensoria have very wide rims and are irregularly arranged. On the third and fourth antennal segments they appear to cover most of the surface. The secondary sensoria

are distributed as follows: On the third antennal segment varying from 18 to 40, average 28; on the fourth varying from 12 to 20, average 15; on the fifth varying from 7 to 9, average 8. All antennal segments finely imbricated and almost entirely hairless. Beak extending almost to the coxae of metathoracic legs.

Thorax and appendages.—Prothorax with lateral glandular areas similar to those found on the lateral surfaces of the abdomen. (These can only be seen on specimens mounted on the side.) Second fork of media not constant in position but usually closer to the first fork than to the margin of wing. Accessory radial thickening present.

Abdomen.—Lateral portion of abdomen with six segmentally arranged glandular areas. Brownish areas of abdomen reticulated. Cornicles equal to or subequal to length of fifth antennal segment, straight with a poorly developed rim at the apex, very finely and closely imbricated throughout their length. Cauda V-shaped, not much longer than its width at the base and not much longer, if as long, as the anal plate. Sides of cauda with numerous fine hairs.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 1.75. Average width of head through the eyes, .40. General color pale yellowish-green with the following exceptions: Head and prothorax sometimes very slightly dusky; tip of fourth and all of fifth and sixth antennal segments slightly dusky; apical portions of femora, tibiae, and all of tarsi light dusky brown; dorsum of abdomen occasionally with very light brownish mottlings; cornicles pale yellowish with apical portions sometimes dusky; cauda and anal plate pale brown; last two segments of beak brown.

Head and appendages.—Antennal segments with the following proportional lengths; III—.23 to .29, average .26; IV—.14 to .19, average .16; V—.13 to .16, average .15; VI—.07 to .09, average .09 plus .36 to .43, average .38. Secondary sensoria usually present only on third antennal segment, only very rarely on the fourth and fifth antennal segments. Sensoria similar to those of alate viviparous female, but less variable in size. On the third antennal segment the sensoria are usually confined to the basal half of the segment and number from 12 to 23, average 16. On the fourth antennal segment the sensoria may vary from 0 to 6, usually 0. On the fifth antennal segment the sensoria may vary from 0 to 5, usually 0. Beak long, usually reaching slightly beyond metathoracic coxae.

Thorax and abdomen.—Thorax and abdomen without lateral glandular areas. Dorsum of abdomen very finely reticulated. The reticulated areas showing best over the brownish mottled areas which are very irregular and not always present. Cornicles similar in shape and structure to those of alate viviparous female; in length subequal to the terminal filament of the sixth antennal segment. Cauda and anal plate similar to those of alate viviparous female.

Specimens of this species may be collected on the crowns of various

species belonging to the genus *Castilleja*, commonly known as Indian Paint-brush.

In the Plant Lice or Aphidae of Illinois specimens of this species key to *Aphis feminea* Hottes, from which they differ in color, in having the tubercles much less developed and in numerous other respects. In the Aphidae of Colorado, Part II, this species keys to *Aphis incognita* Hottes and Frison, from which it differs in type of cornicles, size of lateral tubercles, and color.

Holotype.—Alate Viviparous Female, Skyway, Colorado, July 12, 1932.

Morphotype.—Apterous Viviparous Female, same data as holotype. Holotypic and morphotypic slides deposited in the U. S. National Museum.

***Tuberculatus kiowanica*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate, 1.57. Head and thorax yellowish tinged with light brown. Abdomen light yellowish-green. Cornicles, cauda, and anal plate yellow. Femora light yellowish with a tinge of green. Dorsally near the apex on the femora there is a slight dusky spot. Tibiae with brownish spots at the knees, remaining portions light dusky which become darker apically. Tarsi dusky brown. Stigma yellowish except at base, where it is slightly brownish. Veins of wings brown; anal vein darkest and most heavily bordered with fuscous. All veins ending in fuscous areas which blend into one another so that the veins may almost be said to have a fuscous border. Extreme tip of beak brownish. Antennae light yellowish-brown with apical portion of the segments darker. Surface around secondary sensoria darker than remaining portion of segment.

Head and appendages.—Comparative lengths of antennal segments as follows: III—.79; IV—.50; V—.46; VI—.21 plus .33. Secondary sensoria oval, limited to third antennal segment, numbering five, arranged in a straight row. Posterior to the antennae on the dorsum of the head there are two short, tubercle-like protuberances. Near the posterior margin of the head there is a pair of slightly better developed tubercles. The beak fails to reach the mesothoracic coxae by a considerable distance.

Thorax and appendages.—Prothorax with two pair of finger-like tubercles, the posterior pair considerably longer than the first, mesothorax with a pair of long, finger-like tubercles on the dorsum. Radial sector of wing comparatively short and much bowed. Second fork of media closer to first fork than to margin of wing. All veins fail to reach margin of the wing. An accessory radial thickness is present.

Abdomen.—Dorsum of abdomen with three pair of finger-like tubercles. Cornicles not trapezoidal, more aphid-like except for slight expansion at the apex, length .14. Cauda knobbed, provided with many long hairs, .14 long. Anal plate deeply divided.

Taken as a drift in net while sweeping *Pinus edules* for *Essigella* near Glade Park, Colorado, July 15, 1932.

The species may be immediately separated from *Tuberculatus punctatella* (Fitch) as it has the wings less fuscous, and by the presence of tubercles on

the head and thorax; in these respects it is quite similar to *Melanocallis caryaefoliae* (Davis) from which it differs in color, lateral tubercles, etc.

Holotype.—Alate viviparous female deposited in the U. S. National Museum.

Amphorophora arnicae, Glendenning.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Length from vertex to tip of anal plate, 2.98. Head and thorax dark brown on dorsum, blending to greenish-brown laterally. Abdomen green; lateral margins of abdomen with four brownish spots anterior to the cornicles, and one posterior to the cornicles. Entire body slightly pruinose. Cornicles dark brown to black. Anal plate brownish; cauda brownish at base, remaining portion yellow. Beak yellowish-green with last two apical segments brown; eyes black. First and second antennal segments concolorous with head; third antennal segment yellowish at base, remaining portion dark brown, much darker than the remaining segments, which are also brown. Coxae brown; trochanters yellowish-green. Femora yellowish-green at base, and from one-half to two-thirds of their length, remaining portion dark brown. Tibiae yellowish-brown with their apical portions dark brown; tarsi dark brown. Wings with stigma brownish; veins brown, ending in brownish suffusions.

Head and appendages.—Average width of head across eyes, .60. Antennal tubercles well developed. Antennal segments with the following comparative lengths: III—.86 to 1.07, average .98; IV—.57 to .61, average .58; V—.57 to .61, average .58; VI—.14 to .17, average .16 plus 1.11 to 1.21, average 1.16. Secondary sensoria limited to third antennal segment; irregularly arranged, usually over entire surface, numbering from 41 to 57. Hair on third antennal segment about one-third shorter than width of segment. The beak reaches to the middle of mesothoracic coxae.

Thorax and appendages.—Prothorax without lateral tubercles. Stigma of fore wings comparatively long and narrow, rather sharply pointed at apex. Second fork of media closer to first fork than to margin of wing. Veins fine, ending in brownish suffusions before reaching margin of wing. Femora of all legs with a row of sensoria on their lateral surfaces.

Abdomen.—Without lateral tubercles. The cornicles are either equal to or slightly shorter than the third antennal segment; uniformly swollen distal to middle but constricted again before apex. Apical portion of cornicle with about six rows of closed reticulations, remaining portion roughly imbricated. Anal plate broadly rounded. Cauda very broad at the base, somewhat constricted at the middle, with about three hairs on a side. In length from .36 to .43, average .38.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 3.22. Head and thorax light dusky green. Abdomen green with a grayish cast due to scant pruinence; cornicles dusky brown; cauda yellowish; anal plate dusky brown. First and second antennal segments somewhat

darker than the head; third antennal segment light at the base, remaining portion brown; fourth, fifth, and sixth antennal segments dusky brown with distal portions darkest. Beak with last two segments brown. Coxae and trochanters yellowish-green. Femora with the basal halves yellowish-green, remaining portions dusky brown. Tibiae dusky brown with apical and distal portions darker. Tarsi brown.

Head and appendages.—Average width of head through the eyes, 60. Antennae situated on well developed antennal tubercles. Antennal segments with comparative lengths as follows: III—.89 to .94, average .92; IV—.57 to .59, average .58; V—.59 to .60, average .60; VI—.14 plus .93 to 1.11, average 1.07. Secondary sensoria confined entirely to the third antennal segment; for the most part limited to the basal two-thirds of segment and while irregularly arranged, are confined largely to one side. The primary sensorium on the sixth antennal segment is fringed with a row of stiff spine-like hairs. All antennal segments are more or less imbricated; this is especially true of the fourth, fifth, and sixth segments. The hair on the antennae are spine-like in quality and never longer than the width of the segment. The beak is long, reaching to the base of the metathoracic coxae.

Thorax and appendages.—All femora have sensoria-like structures. The tarsi are very short, being subequal in length to the basal portion of the sixth antennal segment. The hairs on the tibiae are fairly numerous, heavy and spine-like and about equal to the width of the segment in length.

Abdomen.—Average length of cornicles, .87. Cornicles uniformly swollen distal to middle for about one-third of their length and then again reduced in diameter toward their apex; flange poorly developed; apex distinctly reticulated, remaining portion of cornicle imbricated. Anal plate well developed about one and one-half times as wide at the base as long. Cauda constricted, well rounded at the apex, usually with from two to four hairs on a side, length from .31 to .36, average .33.

ALATE MALE.

Size and general color.—Length from vertex to tip of anal plate, 1.86. Color essentially similar to that of alate viviparous female.

Head and thorax.—Antennal tubercles less developed than in the females. Antennal segments with the following proportional lengths: III—.96; IV—.64; V—.57; VI—.14 plus 1.36. Secondary sensoria on third antennal segment numbering from 48 to 52. There are no secondary sensoria on the fourth antennal segment. Secondary sensoria on fifth antennal segment numbering from 19 to 23. Sensoria on third and fifth antennal segments irregularly arranged. Hairs on third antennal segments shorter than width of segment. Beak reaching just beyond metathoracic coxae. Thorax without lateral tubercles. Wings as in alate viviparous female.

Abdomen.—Cornicles .50 long; in shape and reticulations similar to those of female, perhaps slightly less imbricated. Lateral tubercles absent. Cauda long (.17), aphid-like with four hairs on a side, not constricted.

This species is very closely allied to *Amphorophora davidsoni* Mason, to which alate viviparous females key in Mason's revision of the genus *Amphorophora*. I am provisionally retaining *Amphorophora arnicae* as a good species until further collecting substantiates my opinion that the species migrates between thimbleberry and Arnica. In the two years that I have collected *Amphorophora arnicae*, I have never taken it before July 4th, and at that time only alate viviparous females were taken. This might be taken as evidence that the species migrates between thimbleberry and Arnica, were it not for the fact that I have taken but three apterous viviparous females in the two years collecting. The oviparous females are evidently not produced in Arnica, while the males are. This further indicates that a host other than Arnica is the primary one. The differences shown by the males of the two species are but minor differences, with the possible exception of the presence of abdominal tubercles, in the case of the male of *Amphorophora davidsoni* and not in *Amphorophora arnicae*. The fact that the males agree so nearly in peculiar characteristics such as the absence of sensoria on the fourth antennal segment and the short cauda would seem to further suggest that the species are extremely closely allied if not synonymous. Through the courtesies of Professor Glendenning and Dr. Mason, I have been privileged to study cotypic material of the two species concerned.

Morphotype.—Apterous viviparous female taken on Arnica species; Skyway, Colorado, August 15, 1931. *Allotype*.—Alate male, Skyway, Colorado, August 16, 1932. Allotypic and morphotypic slides deposited in the U. S. National Museum.

***Amphorophora tigwatensa*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.78. Average width of head across eyes, .61. Head yellowish-brown with antennal tubercles, the first and second antennal segments, and anterior and lateral margins darker brown. Thorax yellowish-green with thoracic lobes brown. Abdomen quite variable in color, usually light green, occasionally somewhat pinkish on the dorsum, with brownish lateral spots. The pink and the brown blending into green where either are not pronounced. Antennae brown with the exception of the base of the third antennal segment, which is yellowish. The fourth, fifth and sixth antennal segments may be almost black. Beak brown. Stigma brownish, darkest ventrally. Veins of wings dark brown bordered with fuscous. Accessory radial thickening present. Coxae and trochanters yellowish. Femora yellowish at extreme base, gradually increasing in color to apex, where they are a very dark brown. Tibiae almost uniform dark brown. Tarsi brown. Cornicles dark brown. Cauda yellowish, somewhat tinged with fuscous. Anal plate fuscous.

Head and appendages.—Proportional lengths of antennal segments as follows: III—1.04 to 1.26, average 1.17; IV—.93 to 1.00, average .97; V—.86 to .94, average .89; VI—.21 plus 1.14 to 1.22, average 1.19. Second-

ary sensoria confined to third antennal segment, numbering from 25 to 32, averaging 29. Secondary sensoria irregularly arranged but confined to one side of segment, sometimes arranged in an irregular row. The secondary sensoria vary in size and have wide rims. Hairs on third antennal segment (about one-third width of segment), spine-like, not knobbed, but dull at tip. Primary sensorium on sixth antennal segment fringed, with six marginal sensoria at one side. All segments imbricated. Beak extending to mesothoracic coxae.

Thorax.—Stigma of forewings sharply pointed. All veins fail to reach the margin of the wing. Second fork of media closer to the margin of the wing than to the first fork.

Abdomen.—Cornicles varying in length from .89 to 1.00, average .94, not reticulated, imbricated throughout their length. Rimmed as in *Amphorophora rubi* (Kalt.). Cauda varying in length from .34 to .43, average .39, not constricted with from four to five hairs on a side, the hairs being shorter than the width of cauda.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.85. Color essentially similar to that of alate viviparous female except that the legs and antennae are a less intense brown, and that the body is less apt to be of a greenish tint, pinkish brown colored individuals being most abundant.

Head and appendages.—Average width of head through the eyes, .59. Proportional lengths of antennal segments as follows: III—1.07 to 1.17, average 1.14; IV—.81 to 1.07, average .92; V—.71 to 1.00, average .825; VI—.16 to .21, average .19 plus .96 to 1.14, average 1.04. Secondary sensoria confined to third antennal segment numbering from 10 to 15, averaging 12. Secondary sensoria irregularly arranged but confined to one side of segment. Hair on third antennal segment about one-half width of segment. Cornicles varying in length from 1.00 to 1.14, average 1.05. In shape and imbrications similar to those of alate viviparous female. Cauda varying in length from .39 to .40, average .39 plus, usually with four to 5 hairs on a side, shorter than width of cauda and inwardly curved.

Holotype.—Alate Viviparous Female. *Morphotype.*—Apterous Viviparous Female. Collection data to accompany holotypic and morphotypic specimens as follows: Skyway, Colorado, July 26, 1932, on *Rubis species*, on which they were collected on the undersides of the leaves and on the young tender stems. Morphotype and holotype mounted on same slide, deposited in the U. S. National Museum.

Apterous viviparous females of this species key with difficulty to *Amphorophora amurensis* Mordvilko (known only from the apterous viviparous female) in Mason's revision of the genus *Amphorophora*. While admitting that *Amphorophora tigwatsena* may be a synonym of the species described by Mordvilko, my specimens differ from the description of *Amphorophora amurensis*, as translated by Mason, by having the antennae longer than the body, antennal segments three and four not of the same relative lengths,

by the third antennal segments not having capitate hairs, and by the hairs being shorter than three-fifths the width of segment, by the cornicles being imbricated, and by the cornicles being proportionally longer to the length of the body.

Adactynus katonkae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.74. Head light green, showing some duskiness. Thorax green with thoracic lobes somewhat dusky. Abdomen green. Cornicles dusky brown except at the base where they are white or slightly yellowish. Cauda dusky yellow. Anal plate yellowish-brown, considerably darker than the cauda. First and second antennal segments somewhat more dusky green than the head. Antennae except base of third antennal segment and sometimes the base of fourth antennal segment dusky brown to black. Beak greenish with the apical two segments dark brown. Femora light greenish-yellow for a little less than one-half their length, remaining portions shading gradually to dark brown at the apex. Tibiae dark brown, somewhat lighter basely than apically. Tarsi dark brown. Stigma light dusky. Veins brown.

Head and appendages.—Average width of head across eyes, .53. Antennal segments with the following proportional lengths: III—.93 to 1.07, average .97; IV—.71 to .86, average .76; V—.61 to .71, average .67; VI—.17 to .21, average .19 plus 1.00 to 1.14, average 1.09. Secondary sensoria irregularly arranged, confined to third antennal segment, distributed through the entire length of segment and varying in number from 22 to 35, average 33. Hair on third antennal segment rather spine-like and shorter than or just equal to width of segment. The beak reaches about to the middle of the mesothoracic coxae.

Thorax and appendages.—Stigma rather long and sharply pointed. Second fork of media as a rule closer to margin of wing than to the first fork. Veins ending in fuscous areas before attaining margin of wing.

Abdomen.—Cornicles varying in length from 1.21 to 1.50, average 1.36; reticulated at their apex for about one-third their length (.46), remaining portion finely imbricated. Rim at apex of cornicles rather poorly developed. Cauda varying in length from .53 to .64, average .56; not constricted, tapering to a sharp point at the apex, finely imbricated with from three to four hairs on a side. Anal plate normal for genus.

APTEROUS VIVIPAROUS FEMALE.

Average length from vertex to tip of anal plate, 2.85. In color identical with alate viviparous female except that the head is less dusky. Antennae with the following proportional lengths: III—.86 to 1.17, average 1.02; IV—.64 to .79, average .71; V—.60 to .79, average .68; VI—.17 to .21, average .18 plus 1.00 to 1.07, average 1.03. Secondary sensoria confined to one side of third antennal segment and irregularly arranged, varying in

number from 15 to 24, averaging 20, usually not extending beyond basal three-fourths of segment. Cornicles similar to those of alate viviparous female, varying in length from 1.43 to 1.57, average 1.51, reticulated apically for a little less than one-third of their length (.45). Cauda similar to that of alate viviparous female, varying in length from .57 to .79, average .67.

This species keys in most keys to *Adactynus erigeronesis* (Thomas) = *Adactynus erigeron*—*philadelphicum* Raf., from which it may be separated by its larger size, longer cornicles, cauda and antennal segments.

Holotype.—Alate viviparous female, Whitewater, Colorado, August 10, 1932. *Morphotype*.—Apterous viviparous female, same data as holotype. Holotypic and morphotypic slides deposited in the U. S. National Museum. This species was collected on the stems and the undersides of the leaves of *Aster laevis* L. Specimens of this species were observed near Red Cliff, Colorado, August 31, 1932, on the same host.

***Adactynus kiowanepus*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.57. Head, thorax, and abdomen bluish with a reddish tinge, entirely pruinose; color not unlike that found on certain varieties of plums when ripe and unrubbed. Anterior margins of head dusky. Margins of thoracic lobes dusky and the four segments anterior to the cornicles with lateral portions usually dusky. Antennae black or very dark brown except for base of third and all of first and second antennal segments, which are only brown or dusky brown. Beak brown with terminal segment darkest. Coxae and trochanters yellowish. Femora yellowish at extreme base, shading gradually to brown, the brown quickly becoming black or blackish-brown. The area thus colored being equal to about one-third of the length of the segment. Tibiae and tarsi black or blackish-brown. Hairs on antennae and legs with their basal papillae yellowish. Stigma yellowish-brown, accessory radial thickening present. Outer margins of wing slightly fuscous. Veins brownish with just a suggestion of a fuscous border. This border is more pronounced along the radial sector than the media. Cornicles black or very dark brown except for extreme basal portion which may be yellowish or yellowish-brown. Cauda light yellowish brown. Anal plate brownish.

Head and appendages.—Average width of head through the eyes, .60. Antennal tubercles well developed. Antennal segments with the following proportional lengths: III—1.03 to 1.14, average 1.09; IV—.93 to 1.00, average .965; V—.77 to .83, average .81; VI—.17 to .20, average .19 plus 1.26 to 1.29, average 1.28. Secondary sensoria confined to third antennal segment, arranged in a straight row, quite small and due to dark color of the segment very difficult to distinguish, numbering from 8 to 19, averaging 13. Hair on basal half of third antennal segment subequal to width of segment. Hair on apical half of third antennal segment either equal to or longer than width of segment. The beak is short, failing to reach the

mesothoracic coxae by a distance equal to the width of the coxae at their base.

Thorax.—Prothorax without lateral tubercles. Radial sector very much bowed. Second fork of media closer to margin of wing than to first fork. Second segment of hind tarsus, exclusive of claws, equal to basal portion of sixth antennal segment. Cornicles varying in length from 1.14 to 1.31, average 1.21. Reticulated area at apex of cornicles varying from .14 to .17, average .16, and never equal to more than one-seventh of the length of the cornicles, usually nearer one-eighth their length. Portion of cornicles not reticulated distinctly imbricated. Cornicles neither constricted nor swollen, but tapering gradually from a rather wide base to the apex. Cauda varying in length from .50 to .57, average .55, usually with four hairs on one side and five on the other, each hair arising from an angular area which causes the sides of the cauda to appear very coarsely serrate. Cauda constricted just before middle.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.73. Average width of head through the eyes, .60. Color essentially similar to that of alate viviparous female; structurally similar in all respects to alate viviparous female. Antennal segments with the following proportional lengths: III—1.03 to 1.14, average 1.11; IV—.74 to .86, average .77; V—.64 to .76, average .70; VI—.14 to .19, average .16 plus .96 to 1.09, average 1.04. Secondary sensoria confined to basal third of segment, arranged in a straight row, numbering from 3 to 8, generally 5 or more. Cornicles varying in length from 1.17 to 1.36, average 1.31. Reticulated portion of cornicle averaging .16 in length or a little more than one-eighth of the total length of the cornicles. Cauda varying from .57 to .64, average .61. Otherwise similar to that of alate viviparous female.

This species is closely allied to *Adactynus pseudorosae* (Patch) (although it will not key to this species) from which it may be separated by its color in life and by the relative proportional lengths of the third antennal segment and cornicles to each other, and the two of these to the length of the anal vein. It also differs from *Adactynus pseudorosae* by having the cornicles reticulated for one-seventh or less than one-seventh of their length rather than one-sixth or more than one-sixth of their length. In Dr. Patch's key to the genus *Macrosiphum* (Main Agricultural Bulletin #282) specimens of this species key to *Macrosiphum californicum*. In the key to the genus *Macrosiphum* in the Plant Lice or Aphidae of Illinois, the species keys to *Macrosiphum laevigatae* Essig. (The specimens studied by Patch and Hottes and Frison unquestionably being the same species in spite of the use of different names.) From *Adactynus laevigatae* it may be distinguished at once by its color.

Specimens of this species may be collected on the under surfaces of the leaves and the flower stems of *Zygadenus* sp. and *Sieversia ciliata*.

Holotype.—Alate viviparous female, Skyway, Colorado, July 26, 1932, on *Quamasia hyacinthia*. *Morphotype*.—Apterous viviparous female, same

data as holotype. Holotypic and morphotypic slides deposited in the U. S. National Museum.

***Adactynus niwanista*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.19. Head dusky brown, often showing more or less yellow. Thorax yellowish-green with thoracic lobes dark brown. Abdomen light green with four lateral light brown areas anterior to the cornicles and one such area posterior to the cornicles. Dorsum of abdomen with two transverse greenish-brown bands. These bands vary in size, intensity, regularity, and are never distinct. Cornicles light greenish-yellow, becoming slightly dusky towards the apex. Cauda light dusky green. Anal plate light dusky. Third antennal segment uniform light yellowish-brown; fourth antennal segment brown, slightly dusky at the apex; fifth and sixth antennal segments light brown or dusky. Beak yellowish with the exception of two apical segments, which are brown. Stigma light brown. Veins brown, more or less bordered. Coxae and femora light yellowish-green, very faintly dusky toward apex. All tibiae light greenish-yellow except for apical ends, which are brown. Tarsae brown. Entire surface of body pruinose, which gives the insect the appearance of having over-primped.

Head and appendages.—Average width of head across eyes, .76. Antennal tubercles well developed. Antennal segments with the following proportional lengths: III—.79 to .83, average .80; IV—.83 to 1.00, average .90; V—.79 to .83, average .81; VI—.24 to .31, average .28 plus 1.64. Secondary sensoria confined to third antennal segment and except for one or two sensoria are arranged in a straight row, numbering from 12 to 18, usually over 15. Sensoria comparatively small. Hair on third antennal segment fine, shorter than width of segment. Third antennal segment very smooth, the fourth and fifth antennal segments very lightly imbricated, the sixth distinctly so. Primary sensorium on sixth antennal segment apparently without a fringe, with six marginal sensoria on one side of primary sensorium. The beak reaches mid-way between the meta and mesothoracic coxae.

Thorax and appendages.—Prothorax with lateral tubercles. Stigma somewhat pointed, sub-radial thickening present. Second fork of media closer to margin of wing than to first fork; all veins failing to reach the margin of the wing. Second segment of tarsae long, about equal to basal portion of sixth antennal segment.

Abdomen.—Cornicles varying in length from .43 to .57, average .48. Sides of cornicles straight; cornicles of uniform thickness, rather broad and heavy; light colored portion faintly imbricated; dusky portion reticulated, but the reticulated areas are narrow and much elongated, so that at first glance the cornicles appear to be merely distinctly imbricated. Cauda varying in length from .34 to .43, average .38. Cauda non-constricted or but ever so slightly, rather spatula-like with from four to six hairs on a side. Anal plate broad.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.97. Average width of head through the eyes, .70. Entire body fairly uniform pale green, occasionally almost white due to pulverulent matter (pulverulent matter always present). The black eyes of exceptionally pulverulent specimens are exceptionally conspicuous. Antennae pale greenish-yellow except for extreme tip of fifth and all of sixth segments, which are brownish. Legs pale yellowish-green except for apical portions of tibiae and tarsae which are brown.

Head and appendages.—Proportional lengths of antennal segments are as follows: III—.71 to .83, average .77; IV—.87 to .93, average .89; V—.74 to .86, average .78; VI—.26 to .31, average .29 plus 1.50 to 1.57, average 1.52. Antennal tubercles especially well developed. Secondary sensoria confined to third antennal segment, varying in number from 1 to 2, usually only 1; removed from base of segment by distance about equal to length of first antennal segment. Imbrications very faint on third and fourth segments, more pronounced on the fifth and sixth. Hair on antennae sparse, fine, usually shorter than width of segment. Beak usually just reaching anterior margins of metathoracic coxae, sometimes not extending beyond mesothoracic coxae.

Abdomen.—Cornicles varying from .50 to .57, average .52. Otherwise as in alate viviparous female. Cauda varying from .36 to .43, average .41, not constricted, with from four to five hairs on a side.

This species in some morphological respects is suggestive of *Adactynus granarium* (K), (to which it may be keyed in the Plant Lice or Aphidae of Illinois), from which it differs in size and in characteristics shown by cauda, cornicles, and the presence of pulverulent matter.

Holotype.—Alate viviparous female, Skyway, Colorado, August 22, 1932.

Morphotype.—Apterous viviparous female, Skyway, Colorado, August 4, 1932. Specimens of this species were collected on the under-surfaces of the leaves of *Mertensia siberica*. Holotypic and morphotypic slides deposited in the U. S. National Museum.

***Adactynus tutigula*, new species.**

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.50. Head and antennae with exception of extreme base of third antennal segment dusky brown. Prothorax with lateral margins greenish, shading to dusky brown on the dorsum. Thoracic lobes brown, conspicuously outlined with yellowish-green which extends laterally to the sides of the thorax. Coxae and trochanters yellowish-green. Femora yellowish-green at base, remaining portions dusky brown to brown. Prothoracic femora with least amount of brown; metathoracic femora with greatest amount of brown. Tibiae brown, knees and apical portions usually darkest. Abdomen green with four lateral brownish spots anterior to the cornicles and from four to five brownish areas arranged in transverse rows on the dorsum. The brownish areas on the dorsum are very indistinct, subject to great

irregularity and are best seen near the lateral portions of the abdomen where they appear integrated with the lateral brownish areas. Cornicles uniform light dusky. Cauda yellowish-green. Anal plate dusky or concolorous with rest of abdomen. Entire surface of body pulverulent.

Head and appendages.—Average width of head through the eyes, .56. Antennal tubercles moderately well developed. Antennal segments with the following proportional lengths: III—.81 to .87, average .84; IV—.54 to .70, average .64; V—.50 to .57, average .54; VI—.16 to .21, average .18 plus .64 to .71, average .70. Secondary sensoria unequal in size with wide rims, irregularly arranged, covering most of surface, confined to the third antennal segment, numbering from 47 to 60, averaging 54. Hair on third antennal segment sparse and fine, shorter than one-third width of segment. All antennal segments finely imbricated. The beak fails to reach the mesothoracic coxae by a considerable distance.

Thorax.—Prothorax with poorly developed lateral tubercles. Stigma rather long and sharply pointed. Second fork of media closer to margin of wing than to first fork. All veins fail to reach the margin of the wing.

Abdomen.—Brownish lateral areas on the abdomen, each with a very small tubercle. Brownish areas on dorsum of abdomen for the most part reticulated. Cornicles straight, rather heavy, with a slightly developed flange at apex, imbricated throughout their length but with the imbrications most distinct apically, varying in length from .31 to .36, average .34. Cauda varying in length from .21 to .29, average .23, with just a suggestion of a constriction near the middle, with about three hairs to a side.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.66. Average width of head across eyes, .58. Entire body pale yellowish-green except for the apical portion of the fifth antennal segment, all of the sixth antennal segment, the apical portions of tibiae, and the tarsi, which are brown. Antennal segments with the following proportional lengths: III—.77 to .86, average .80; IV—.51 to .64, average .55; V—.46 to .50, average .47; VI—.17 to .20, average .18 plus .61 to .74, average .65. Third antennal segment with from 2 to 10 small circular sensoria near the base, usual number of sensoria 6. All antennal segments finely imbricated. Beak reaching just to base of mesothoracic coxae.

Thorax.—Prothorax with lateral tubercles but they are so small that they are easily overlooked.

Abdomen.—Abdominal segments with minute lateral tubercles. Cornicle varying in length from .33 to .36, average .35. Otherwise as in alate viviparous female. Cauda as in alate viviparous female, varying in length from .23 to .26, average .24.

This species is suggestive of *Adactynus nigwanista* new species, from which it differs in the number and arrangement of secondary sensoria and the imbrications of the cornicles being more conspicuous.

Holotype.—Alate viviparous female, Skyway, Colorado, July 26, 1932, on *Capnoides* sp. *Morphotype.*—Apterous viviparous female, same

data as holotype. Morphotypic and holotypic slides deposited in the U. S. National Museum. This species is exceptionally abundant on the under-sides of the leaves and upon the flower stems of its host.

Adactynus wasintae, new species.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 1.37. General color of body except appendages pale dull green. Antennae varying from pale greenish, concolorous with the head, to pale dusky brown. Femora pale yellowish-green throughout or yellowish-green at the base with the apical portions light dusky. Tibiae light brown with apical portions considerably darker. Tarsi brown. Cornicles and cauda light dusky green. Beak yellowish-green except for the apical segment, which is darker.

Head and appendages.—Average width of head across eyes, .46. Antennal segments with the following comparative lengths: III—.71 to .91, average .80; IV—.66 to .76, average .67; V—.54 to .64, average .60; VI—.16 to .21, average .19 plus .79 to .93, average .83. Secondary sensoria confined to basal one-third of third antennal segment, arranged in a straight row, numbering from 1 to 4, usually 2. The beak reaches about to the middle of the metathoracic coxae. The apical segment of the beak is as long as the tarsi exclusive of claws.

Abdomen.—Cornicles subequal to the fourth antennal segment in length. Sides of cornicles straight but tapering somewhat to the apex, which has a weakly developed flange, entire surface weakly imbricated. Cauda about two times length base of sixth antennal segment, not constricted, with three pairs of hairs on a side.

This species may be collected preferably by beating *Dasyphora fruticosa* (as they never occur abundant enough to make collecting in the usual manner worth while). Once observed by beating, single specimens may be taken on the undersides of the leaves of the host plant. So far only apterous viviparous females have been observed in spite of the fact that alate viviparous females were searched for biweekly throughout two seasons collecting. Specimens of this species are somewhat suggestive of minute specimens of *Adactynus pisi* (Kalt.).

Holotype.—Apterous viviparous female; Skyway, Colorado, August 4, 1932, on *Dasyphora fruticosa*, deposited in U. S. National Museum.

Dactynotus wahinkae, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 1.84. Body bright, shiny, greenish-bronze with a metallic luster. Head and first two antennal segments dark dusky brown. Thorax for the most part dark dusky brown, remaining portion green. Abdomen dark green with five lateral brownish areas anterior to the cornicles and two brownish areas posterior to them. In addition to the lateral brownish areas on the

abdomen there may be transverse rows of more or less indistinct brownish areas or spots on the dorsum of the abdomen, each row consisting of about six, more or less irregular, brownish areas which vary considerably in size. Cornicles light yellowish dusky. Cauda and anal plate light dusky brown. Antennae varying from brown to black with the third segment darkest. Basal portions of segments, especially of the third segment, lighter than the remaining portion. Last two apical segments of beak dark brown, remaining portion greenish mottled with brown. Coxae dark brown. Femora with basal halves greenish, remaining portion gradually shading to dark brown. Tibiae brown, gradually growing darker from the middle towards the apical end. Tarsi dark brown. Stigma dark brown. Accessory radial thickening present. Veins very dark brown, bordered with fuscous.

Head and appendages.—Average width of head, .50. Antennal tubercles present not gibbous, for genus poorly developed. Hair on vertex of head slightly enlarged at the tip. Antennal segments with the following relative lengths: III—.71 to .79, average, .74; IV—.36 to .50, average .45; V—.31 to .39, average .36; VI—.09 to .14, average .13 plus .71 to .93, average .84. Secondary sensoria confined to third antennal segment ranging in number from 49 to 64, average 58. Hair on third antennal segment confined to one side of segment and shorter than the width of segment and sharply pointed. The secondary sensoria are very tuberculate and irregularly arranged over the entire surface of the segment. Primary sensoria on basal portion of sixth segment with a group of six marginal sensoria on one side. Beak short, as a rule not reaching mesothoracic coxae.

Thorax and appendages.—Stigma of fore wings somewhat pointed at the apex. Second fork of media usually midway between first fork and margin of wing; when not so, closer to margin. All veins fail to reach the margin of the wing and end in fuscous infusions which have a tendency to form a border. Darkened areas of femora with sensoria. Wings usually gummed up so that flight is impossible.

Abdomen.—Cornicles varying from .19 to .21, average .19, faintly imbricated and slightly constricted just before the poorly developed flange. Cauda varying from .14 to .17, average .16, extending beyond anal plate for less than half its length, finely imbricated, rather thick and blunt with about four hairs on a side. Anal plate normal. Abdomen clothed with long hairs which are slightly enlarged at the tip.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.93. Average width of head, .51. Color varying from green with dusky markings to fairly dark brownish-green with a metallic luster, in which case the brownish areas mentioned as being present on the abdomen in the alate viviparous female do not show. Head and first two antennal segments greenish-brown shaded with dusky. Anterior portion of abdomen slightly more dusky and less greenish than the posterior portion of the abdomen. In light colored specimens there may be distinguished, beginning with the thorax, about ten rows of brownish spots arranged transversely across the

dorsum of the body. These spots show only along the margin of the abdomen in the darker forms. The spots on the thorax are more or less confluent on the dorsum. On the dorsum of the abdomen each spot gives rise to a hair which is slightly enlarged at the tip. The lateral spots on the abdomen may bear two or more hairs each. Antennae brownish with the apical portion of the segments darker. Beak, cauda, cornicles, and legs as in the alate viviparous female or but slightly darker.

Head and appendages.—Antennal tubercles as in alate viviparous female. Antennal segments with the following relative lengths: III—.60 to .71, average .67; IV—.30 to .43, average .36; V—.29 to .31, average .30; VI—.10 plus .57 to .71, average .64. Secondary sensoria confined as a rule to the basal half of the third antennal segment, irregularly arranged but partial to one side, varying in number from 11 to 38, average 24, usually more than 20. Sensoria less tuberculate than those of alate viviparous female. Hair on third antennal segment almost as long as width of segment, inclined to be rather sharply pointed. Beak reaching midway between meso and metathoracic coxae.

Abdomen.—Cornicles varying from .19 to .21 in length. Similar in shape and structure to those of alate viviparous female. Cauda .16 long, similar to that of alate viviparous female in form.

This species may be collected on the flower heads and later on the seed pods as well as on the under-side of the leaves of *Delphinium occidentale*. It is very difficult to place generically. It differs from *Aphis rociadae* Cockerell, the only other species recorded from the host, generically, in color, and biologically. I know of no near relative within the genus that I have placed it in.

Late in the fall there is a tendency for this species to produce bright reddish-orange colored specimens which are morphologically identical, in all respects, with the species here described.

Holotype.—Alate viviparous female, Skyway, Colorado, August 15, 1932, on *Delphinium occidentale*. *Morphotype.*—Apterous viviparous female same data as Holotype. Holotypic and morphotypic slides deposited in the U. S. National Museum. Specimens of the above species have also been taken on *Aconitum columbianum* in the type locality.

Dactynotus (Kakimia) takalus, new species.

ALATE VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.14. Head and thorax dusky brown. Abdomen yellowish-green. Cornicles with basal areas concolorous with abdomen, remaining portions slightly dusky. Cauda and anal plate yellowish-brown. Antennae concolorous with the head or but slightly darker except for base of third antennal segment, which is yellowish (third segment usually darkest). Legs with basal half of femora yellowish-green, remaining portions of femora brown. Tibiae either uniform brown or light brownish with apical portions darker. Tarsi brown. Hairs on tibiae with basal papillae yellow-

ish. Stigma of wings with inner margins brownish. Veins dark brown and bordered. Accessory radial thickening present.

Head and appendages.—Width of head through eyes, .48. Antennal tubercles not well developed, similar in this respect to species in the subgenus *Kakimia*. Antennal segments with the following comparative lengths: III—.71 to .80, average .76; IV—.30 to .36, average .34; V—.23 to .26, average .25; VI—.07 to .1, average .09 plus .53 to .57, average .56. Secondary sensoria arranged very irregularly and very tuberculate on the third and fourth antennal segments. On the third antennal segment ranging from 63 to 70, average 66; on the fourth antennal segment numbering from 16 to 23, average 20. Primary sensorium on the sixth antennal segment small with a group of six marginal sensoria grouped at one side. Hair on third and fourth antennal segments shorter than width of segment and somewhat blunt at the tip or ever so slightly enlarged apically. The beak reaches to or slightly beyond the middle of the metathoracic coxae.

Thorax and appendages.—The prothorax is without lateral tubercles. Second branch of media varying all the way from being closer to the margin of the wing than to the first branch to being midway between the first branch of the media and the margin of the wing. None of the veins reach the margin of the wing. Tarsi very short, shorter than basal portion of the sixth antennal segment.

Abdomen.—Cornicles straight (varying in length from .31 to .41, average .36), with a very poorly developed flange at the apex; dusky portion usually more or less imbricated. Cauda somewhat narrow for length, subequal to the fifth antennal segment in length; somewhat constricted near the middle with two or three inwardly curved hairs on a side. Anal plate normal for the genus.

APTEROUS VIVIPAROUS FEMALE.

Size and general color.—Average length from vertex to tip of anal plate, 2.38. Entire body light greenish-yellow. Antennal segments light yellowish-brown basely with the apical portions darker. Terminal segment of beak brown. Legs yellowish-green except for apical portions of tibiae and tarsi which are brown. Cornicles lighter in color than the abdomen with just a suggestion of duskiness at their apex. Cauda and anal plate slightly brownish.

Head and appendages.—Width of head through eyes, .50. Antennal segments with the following comparative lengths: III—.50 to .66, average .60; IV—.29 to .33, average .31; V—.17 to .27, average .23; VI—.09 to .1, average .095 plus .43 to .50, average .48. Secondary sensoria irregularly arranged on the third antennal segment, where they number from 13 to 41, average 25. Sensoria less tuberculate than those of alate viviparous female, usually confined to one side of the segment. When present on the fourth antennal segment, the sensoria vary from 1 to 7. The beak reaches beyond the coxae of the mesothoracic legs. Legs similar in structure to those of alate viviparous female.

Abdomen.—Cornicles subequal in length to terminal processes of sixth

antennal segment; similar in other respects to those of alate viviparous female. Cauda about equal to fifth antennal segment in length, otherwise similar to that of alate female. Specimens of this species may be collected on the undersides of the leaves and on the flower stems of *Gilia aggregata*.

This species keys in the Plant Lice or Aphidae of Illinois to *Myzus lactucae*, from which it differs in the type of cornicles, the type of antennal tubercles, and color markings on abdomen.

Holotype.—Alate viviparous female, Whitewater, Colorado. *Morphotype*.—Apterous viviparous female, Whitewater, Colorado, July 8, 1931. Holotypic and morphotypic slides deposited in the U. S. National Museum.